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MEETING LOG DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: Meeting of the ANSI Z21.47 ANSI Z21/CGA Joint Central
Furnace Technical Working Group

PLACE: International Approval Services, Inc., Cleveland, Ohio

MEETING DATE: May 14-15, 1997

LOG ENTRY SOURCE: Ronald A. Jordan

RAJ

ENTRY DATE: May 21, 1997

COMMISSION ATTENDEES:

Ronald A. Jordan, ESEE

NON-COMMISSION ATTENDEES:

See attached member attendee list

MEETING SUMMARY:

Item 6. Consider a proposal to revise the harmonized central furnace standard to provide coverage for disconnected vents.

Staff reiterated its recommendation that the vent safety shutoff system provisions in the central furnace standard be expanded to include disconnected vent coverage. This recommendation was originally made in a letter dated October 29, 1996 and present by staff at the November 5-6, 1996 meeting of the Joint Central Furnace Subcommittee.

To support the recommendation, staff presented information compiled from review of investigation reports involving disconnected furnace vents. This information was forwarded to the Technical Working Group (TWG) via Mr. Bob Stack of International Approval Services in a letter dated May 14, 1997. Staff discussed the vent failure mode/condition, location of vent disconnect, and injury data columns in the tables titled "Review of Selected Furnace Investigations Involving Disconnected Vent Pipes (1989-1996)" attached to the May 14th letter. Staff informed the TWG that:

- *60 of 143 investigation reports had been reviewed
- *19 of 60 of the reports involved disconnected vents
- *28 deaths and 33 injuries occurred

One of the TWG members stated that an attempt to address disconnected vents was made during development of the original vent safety shutoff system coverage, but that a technology or reliable method of detecting a disconnect along the length of a vent had not been discovered. Staff asked the TWG what work had been done lately on this issue. The TWG member stated that no work had been conducted on this issue recently. Staff stated that given the number of deaths and injuries and the potential

for more failures to occur, that now would be a good time to revisit this issue.

Some of the TWG members expressed opinions that a few of the vent failure modes and conditions listed in the review tables could also be attributed to consumers and service technicians not being educated on the proper installation and maintenance of vent systems. Staff agreed that a few of the incidents might have been attributable to a lack of education among consumers and service technicians, but pointed out that most of the incidents involved failure modes that occurred as a result of vent conditions and failures that would not have been prevented by better educated consumers or service technicians. After further discussion, the TWG agreed that the disconnected vent issue should be addressed as follows:

1. Draft a work statement for submission to the Gas Research Institute (GRI) to develop or locate the technology necessary to sense a disconnected vent condition and shut the furnace off. The TWG adopted the following purpose for the work statement:

"Purpose: To reduce incidents and injuries due to CO poisoning caused by vent system disconnect failure."

The TWG agreed to include the following provisions in the draft work statement:

- *installer and customer training;
- *system to shutoff category I, II, III, and IV furnaces if the vent pipe becomes disconnected;
- *coverage for inlet air pipes in direct vent units;
- *hard lockout/manual reset;
- *coverage for disconnects anywhere in the vent pipe;
- *technology must be economically feasible in the furnace market;
- *usage of any available technology;
- *an indication that TWG considers this a high priority;
- *potential safety devices must work in common and dedicated vent furnaces; and
- *work statement should include CPSC recommendation (Ref: CPSC letter to Bob Stack, dated October 29, 1996) and investigation review (Ref: CPSC letter to Bob Stack, IAS, dated May 14, 1997).

The TWG members committed to completing a final draft of the work

statement by or before July 15, 1997. The final work statement will be submitted to GRI separately through the following organizations to emphasize the priority of this issue:

- *ANSI Z21.47 Central Furnace Subcommittee (at its September 1997 meeting) and the ANSI Z21 Committee (no meeting date specified)

- *GRI Venting Technical Advisory Group (at its July 1997 meeting)

- *Gas Appliance Technology Center (GATC)

- *Gas Appliance Manufacturer's Association (GAMA) (via the GAMA representative at the TWG)

A TWG member indicated that GRI's work load is full for calendar year 1997, therefore, the earliest GRI could take on the proposed work would be in calendar year 1998. When asked by staff, one of the TWG members replied that funding and how this work request is prioritized would be key to getting GRI to take on the work. One of the TWG members stated that any involvement from CPSC in encouraging GRI to accept this proposed work would be helpful.

2. Review and develop recommendations that improve the vent joint integrity provisions in the American and Canadian vent pipe standards, UL 1738 and ULC 636 respectively.

A small working group was established to finalize a work statement for GRI and to develop recommendations to improve the vent joint integrity in the American and Canadian vent pipe standards.

Other meeting agenda items of interest to staff were as follows:

Item 1. Consider comments received on proposed revisions to the harmonized central furnace standard.

Log numbers 203, 201, and 210 of this agenda item included comments that addressed warnings for furnaces equipped with negative pressure valves. At its November 1996 meeting, the Central Furnace Subcommittee discussed the issue of how to warn service personnel and consumers of the dangers of improper replacement of negative pressure valves on furnaces. The subcommittee forwarded a proposed warning, to be included in Sections 1.23.1-g (Instructions), 1.24.2-f (User's Information Manual), and 1.25.18 (Marking) of the central furnace standard, to the TWG for further review. The warning read as follows:

"WARNING

This appliance uses a **NEGATIVE PRESSURE REGULATED** gas control. Replace only with the same model number or equivalent as specified by the manufacturer.

Carbon monoxide poisoning, fire or explosion could

result from improper control replacement."

One of the TWG members stated that the phrase "or equivalent" might encourage a service technician to attempt to interpret what an equivalent replacement gas control is, and replace it with an inappropriate control. He made reference to an incident in Chicago in which a negative pressure valve was replaced with an improper valve allegedly resulting in excessive carbon monoxide production and the death of ten family members. Staff indicated that CPSC had been involved in investigating that incident. Staff expressed a concern that by limiting the replacement options for negative pressure controls, a service technician might select an inappropriate replacement if the correct control is not available. This concern was shared by other TWG members. During the discussion, a consensus was reached with TWG members and staff that furnace manufacturers know their product requirements and therefore should be the only entity to specify suitable replacement valves. To address this concern, the TWG added "furnace" in front of "manufacturer" and deleted "or equivalent." This revised wording was adapted for distribution to the full subcommittee for review and comment. The TWG also agreed to coordinate this wording with the gas control subcommittees (i.e. Z21.78 and Z21.18) to obtain concurrence.

The revised warning reads as follows:

"WARNING

This appliance uses a **NEGATIVE PRESSURE REGULATED** gas control. Replace only with the same model number as specified by the furnace manufacturer.

Carbon monoxide poisoning, fire or explosion could result from improper control replacement."

Item 8. Consider a request to revise the harmonized central furnace standard to include coverage for marking pressure switches with minimum and maximum pressure settings.

The TWG rejected this request. Its rationale was that a single set point or maximum and minimum pressure set points are not adequate for a service technician to replace a pressure switch. The TWG also indicated that a single set point or maximum and minimum pressure setting might encourage a service technician to attempt to field calibrate a pressure switch or to replace a failed pressure switch with one that has the same set point pressure or maximum and minimum pressure markings, but that operates differently. Staff stated that this issue (i.e. improper replacement of a pressure switch) sounds similar to improper replacement of a negative pressure valves (Ref: Item 1). A TWG member replied that it is similar and similarly only a model number should be printed on the pressure switch to identify it. He also stated that if pressure settings were printed on the unit, a technician might attempt to replace it with a switch with a similar pressure ranges, but that operates differently. Staff agreed that this could be a problem and questioned whether the

consequences could be as severe as those associated with the negative pressure valve. A TWG member responded that the consequences would be more of a nuisance, since the likely differences of using the wrong pressure switch would be a negligible delay in actuation of the switch.

Item 10. Consider a request to revise the harmonized central furnace standard as an alternative to the flame spread rating of 25 and the smoke developed rating of 50 when tested as specified in UL 723.

Larry Brand (GRI), Joe Allen (UL), Bob Backstrom (UL), and David Ball (Batelle) presented and discussed with the TWG the "Final Report on Development of Technology Base for Application of Plastics to Condensing Heat Exchangers," GRI 95/0451, dated December 1996. This report focused on developing and incorporating alternative performance and test conditions to the flame spread rating and smoke developed rating currently in Section 1.4, Polymeric Materials in Air Handling Compartments, of the central furnace standard. The alternative performance and test provision would accommodate the use of polymeric materials in the secondary heat exchangers of condensing furnaces.

When asked by staff, the TWG indicated that the work conducted by GRI resulted from furnace manufacturers expressing interest in having GRI conduct this work. Names of manufacturers were not cited. The presenters cited cost reduction, durability of material, and having an alternative to the current test as being potential benefits of adopting the alternative method. The current method, which includes a Steiner Tunnel Test, was viewed by the presenters as being inappropriate and restrictive.

In evaluating the ability of polymeric materials to withstand representative temperatures for this application, the presenters indicated that they used a blocked filter as the worst case test condition for heat rise in this region of the furnace. The maximum heat flux they measured was 18 kW/m².

Staff questioned whether the blocked filter condition would be the worst case condition for heat rise and asked whether a failed high (temperature) limit switch would provide a more severe test. Staff summarized for the presenters and TWG members an incident in which a high (temperature) limit failed in a furnace equipped with a plastic condensate pan. Staff indicated that the pan warped and sagged onto a heat exchanger at which point it ignited and began to smoke. Although the pan apparently self-extinguished, the smoke from the incident was distributed through the furnace duct system into the house. Staff expressed its concern that polymeric materials, such as used in the plastic condensate pan, would be subject to high temperatures and fail in the same manner and with the same consequences as discussed in the incident.

The presenters replied that the proposed test method includes an

auto-ignition test. According to the presenters, this would ensure that plastics used in secondary heat exchangers would not ignite when exposed to high temperatures. They also indicated that a polymeric material's melting point would be reached before its auto-ignition temperature would be reached. It was noted that the current method, which requires the use of a Cone Calorimeter, does not address toxicity from off-gasing or smoke, or deformation of the material. The alternative method does not address smoke spread, toxicity, or mechanical integrity of polymeric materials. Staff expressed concern that given the failure mode and result in the incident described, these unresolved issues should be addressed in order to prevent future incidents. The TWG decided to recommend that this issue be adopted for review and comment by the central furnace subcommittee. The unresolved issues will be raised and addressed during the review and comment process.

cc:

Office of the Secretary
Colin Church
ESEE Chronological File

Z21/CGA JOINT CENTRAL FURNACE
TECHNICAL WORKING GROUP

Michael Eberlein (CHAIRMAN)
Manager Furnace Products
York International
Elyria, OH 44035
216/323-5561 X 279
FAX 216/284-2422

Paul E. Beach
Manager, Gas Industry Standards
White-Rodgers Division
Emerson Electric Company
24651 Center Ridge Road Suite 325
Westlake, OH 44145
216/835-1300
FAX 216/835-1304
e-mail: Pbeach@apk.net

✓ Jim Hickson
Team Leader
Lennox Industries Inc.
P. O. Box 10877
Carrollton, TX 75011-0877
214/497-7207
FAX 214/497-7879
e-mail: jim.hickson@lennoxind.com

✓ Glenn T. Hooker
Union Gas Limited
750 Richmond Street
P. O. Box 2001
Chatham, Ontario, Canada
N7M 5M1
519/436-4600, ext. 3023
FAX 519/436-5461
e-mail: ghooker@ugas.e-mail.com

X Daryl L. Hosler
Codes & Ordinances Manager
Southern California Gas Company
M.L. 25HO, Box 3249
Los Angeles, CA 90051-1249
213/244-2525
FAX 213/244-8241
e-mail: DHOSLER@pacent.com

✓ Michael Kirkpatrick
Senior Product Engineering
Consolidated Industrial Corp.
P. O. Box 7800
3535 Brady Lane
Lafayette, IN 47903
317/477-9545
FAX 317/477-9599

X Louis Jacques
Riello Canada Inc.
216 Meadowpine Boulevard
Mississauga, Ontario, Canada
L5N 6H6
416/542-0303
FAX 416/542-1525

✓ Gregory A. Lynch
Amana Refrigeration, Inc.
HAC Division
Wilson Parkway
Fayetteville, TN 37334
615/438-2182
FAX 615/438-2189

✓ Donald L. Shrader
General Supervisor, Gas Service
Baltimore Gas and Electric Co.
1699 Leadenhall Street
Spring Garden Complex
Baltimore, MD 21230
410/291-5130
FAX 410/291-4870
e-mail: Donald.L.Shrader@bge.com

✓ Kelvin Kleman
Manager, Heating Equipment
Rheem Manufacturing Company
Air Conditioning Division
P. O. Box 17010
Fort Smith, AR 72917-7010
501/648-4974
FAX 501/648-6131

✓ Hall Virgil
Principal Staff Engineer
Residential Heating Products Development
Carrier Corporation
P. O. Box 70
Indianapolis, IN 46206
317/240-5291
FAX 317/481-5707
e-mail: Hall.Virgil@carrier.utc.com

✓ John Gorman, IAS
✓ Bob Stack, IAS
✓ Monsi X Ahn, The Trane Co.
✓ Dave Delaquilla > Honeywell
✓ Al Anderson
✓ Gary Thibault, GAMA